present translation, which appears under the editorship of Prof. Livingston, of the Johns Hopkins University. The present work is based on the German edition, but it has been collated with the seventh Russian edition, which appeared in 1914, and any alterations have been included in the English text. Hitherto there has been available to students no text-book of plant physiology of small compass which could serve as an introduction to the larger works of Pfeffer and Jost. This book admirably fills the gap.

On p. 2 of the Introduction we find a list of the heats of combustion of hydrogen, carbon, starch, glucose, etc., and on p. 3 a discussion of the catalytic action of enzymes. It is thus clear from the outset that the author views the plant from the physico-chemical point of view, and keeps well to the front the dynamical aspects of the chemical processes occurring. Associated with this we find that—in the words of the editor—"Palladin's writing is more free from teleological misinterpretation of the relation between conditions and results than is that in most of the text-books hitherto available." The book may thus safely be put into the hands of students without the risk of the acquirement of a slovenly and unprogressive habit of thought.

The editor has provided footnotes—the authorship of which is clearly indicated—where the matter required bringing up to date or the author's treatment of a subject seemed to require elucidation or correction. These additions very greatly increase the value of the book, and many of them, as readers of Prof. Livingston's papers might expect, are models of what critical notes should be. These notes are most numerous in connection with photosynthesis, osmotic pressure, and water movement.

The book naturally brings to the front the work of Russian botanists, and renders available some results which the barrier of language has hitherto kept almost unknown. The treatment of fermentation and respiration, subjects to which valuable contributions have been made by Palladin and his pupils, is particularly good, but Kidd's work on the effect of carbon dioxide on both aerobic and anaerobic respiration should have been noted. The relation of oxygen to fermentation by yeast, which is imperfectly or erroneously treated in most text-books, is well brought out, though reference might have been made to the work of Horace Brown on the "occlusion" of oxygen by yeast-cells. Readers will be particularly glad to have an account of Palladin's work on the respiration of dead plants and of his chromogen theory of respiration. In dealing with transpiration both the part played by the stomata and the physical factors controlling the rate of diffusion of water-vapour from the plant might have been dealt with more fully. Mention might also have been made of the fact that both Gaidukov's observations on the reaction of Oscillaria to light of different colours, and those of Czapek on the relation of homogentisic acid to geotropic response, have been called in question. The treatment of growth, movement, and reproduction in part ii. is very much slighter than that of metabolism, and the subject of heredity is not dealt with at all.

All the citations of literature have been verified and the form of reference has been rendered uniform; special attention has also been paid to the transliteration of Russian names. Botanists will be interested to learn that, on his own authority, the author's name should be pronounced "Pal-lad′-din." V. H. B.

FUNDAMENTAL PRINCIPLES OF CHEMISTRY.

Stoichiometry. By Prof. S. Young. Second edition. Pp. xiv + 363. (London: Longmans, Green, and Co., 1918.) Price 12*s.* 6*d.* net.

As was explained in the notice which appeared on the issue of the first edition (NATURE, vol. lxxviii., 1908, p. 98), this book, which forms one of the well-known series of text-books of physical chemistry edited by the late Sir William Ramsay, deals with the fundamental principles of chemistry.

The present notice is devoted primarily to a consideration of the new matter which has been introduced into the book in order to give some account of the results arising from the numerous investigations carried on during the last decade. Of these results, none, perhaps, have had a greater influence on our fundamental conceptions than those which have been arrived at as a consequence of the investigation of radio-active substances. We have become familiar with the idea of non-separable, or isotopic, elements, which may, or may not, have the same atomic weight. Prof. Young adopts the recommendations of Paneth as giving, perhaps, the best definition of the term "element"; according to this suggestion, isotopes are to be regarded, not as different elements, but as varieties of the same element, so that an "element" may be pure or mixed according to whether it contains only one kind of atom or different varieties of isotopic atoms. The recent determinations of the atomic weight of lead derived from different sources, which have a bearing on the same subject, are referred to, while in the chapter dealing with the periodic law, after explaining the modern conception of an atom, the author gives a short *résumé* of the conclusions drawn by Soddy, Russell, and Fajans regarding the positions taken up in the periodic table by the products of the disintegration of atoms. No reference is made in this chapter to the difficulty which has been experienced in including the rare earth elements in the table, while a still more surprising omission is the absence of any allusion to the exceedingly valuable work of Moseley on the X-ray spectra of the elements, which has provided us with a method for the determination of atomic numbers and has led to results of the highest importance.

The numerous investigations relating to osmotic pressure which have been carried on in England

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and America are described and discussed, while the section dealing with adsorption has been extended so as to include an account of recent work in this field.

A description is also given of several new practical methods. Amongst these may be mentioned Morgan's method for determining the molecular weights of liquids from the weight of falling drops, and the methods suggested by Smith and Menzies for the determination of the boiling points and vapour pressures of substances.

From the examples which have been given, it will be evident that, with one or two exceptions, the book has been brought thoroughly up to date, and can be confidently recommended to anyone desirous of having a clear and comprehensive account of modern views relating to such subjects as the properties of atoms and molecules, and the general properties of gases, liquids, and solids.

J. K. W.

OPTICS IN EUCLID'S TIME.

L'Ottica di Euclide. By Prof. G. Ovio. ("Manuali Hoepli.") Pp. xx+415. (Milano: Ulrico Hoepli, 1918.) Price 7.50 lire.

It need scarcely be pointed out here that the greater portion of what we now call "optics," dealing as it does with applications of the laws of refraction, was unknown in the days of the Greek geometer. In this small volume Prof. Giuseppe Ovio, of Genoa, has condensed an exposition of the contents of two volumes known as "Optics" and "Catoptrics," of which the first is believed certainly to be due to Euclid, while his authorship of the second is regarded as rather more doubtful. In preparing this book Prof. Ovio has mainly based his work on the editions of Pena, Danti, and Heiberg, but has also consulted those of Gregory, Zamberto, and Freart.

"Optics Properly So-called," which forms the title of the first portion, is practically equivalent to our perspective geometry. It deals with the apparent dimensions of objects seen at different distances and in different directions. It thus consists of a collection of propositions really purely geometrical in character. For example, one proposition proves that an eye situated near a sphere sees less of it than one further off, but the visible portion appears larger. There are some theorems, on the other hand, of which the purport and meaning are rather vague, and Prof. Ovio's comments on these will be found useful. "Catoptrics" deals with reflection at curved surfaces. The propositions include proofs that a plane mirror produces an inverted image of the same size as the object, that rays after reflection at a concave surface sometimes converge and at other times diverge, and a large number of other properties, of which these may be regarded as typical representatives. According to Euclid, visual rays emanated from the eye and went to the objects.

Now that the younger generation no longer acquires its geometrical ideas from Euclid's elements, an interesting variation on our overstereotyped school curricula might very well be introduced by occasionally teaching the subject-matter of this volume. Many of the proofs afford quite interesting lessons in deductive methods, and could very well be accompanied by excellent exercises in constructive geometry. But, unfortunately, the subject in its present form does not fall within the syllabus of school examinations.

G. H. B.

OUR BOOKSHELF.

Descriptive Catalogue of the British Scientific Products Exhibition, with Articles on Recent Developments. Pp. xxiv+268. (London, 199 Piccadilly: British Science Guild, 1918.) Price 2*s.* 6*d.* net.

The record of industrial achievement during the period of the war shown at the recent British Scientific Products Exhibition organised by the British Science Guild was much enhanced by the publication of a comprehensive descriptive catalogue. Whilst the contained details of the exhibits and their technical applications added interest to their examination and form a valuable record for reference, the inclusion of a series of articles on recent industrial developments should do much to drive home and explain what has been accomplished during the past four years by the successful co-operation of science and industry, and what is needed for that fuller and more permanent effort which is required to secure industrial progress and efficiency. The story has been told in many forms, but every repetition that can extend an appreciation of the problem is to be welcomed. The catalogue of exhibits contains concrete examples of recent developments which form the basis for the story, and their direct association with a series of twenty concise and well-written articles by authorities whose names are a guarantee of first-hand knowledge provides a helpful correlation between the results obtained in works and laboratories and the objects and methods which have secured their realisation.

Mathematical Papers for Admission into the Royal Military Academy and the Royal Military College, and Papers in Elementary Engineering for Naval Cadetships, November, 1917, and March, 1918. Pp. 40. *Elementary Engineering Papers for Naval Cadetships (Special Entry) for the Years* 1913–1917. Pp. 33. Both edited by R. M. Milne. (London: Macmillan and Co., Ltd., 1918.) Price of each 1*s.* 3*d.* net.

A volume of mathematical papers set to candidates for admission to the Military Academy and College was reviewed in a recent issue of Nature. The first of the present publications is a further set of such papers. The other book contains the papers in elementary engineering set at recent examinations for Naval Cadetships. The questions in this collection cover the ground of the elementary theory of steam- and gas-engines, link motions, lathes, etc., and also presuppose some knowledge of the theory of hydrostatics, heat, and

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